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**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**
REGION 8
999 18TH STREET - SUITE 500
DENVER, CO 80202-2466

**Ref: 8EPR-ER**

**PUBLIC DOCUMENT**

JUN 22 2000

**ACTION MEMORANDUM**

**SUBJECT:** Request for a Classic Emergency Removal Action at the **Rico Town Pond** (aka Rico-Argentine) Site, located north of the town of Rico, Dolores County, Colorado.

**TO:** Site File

**FROM:** Tien Nguyen, On-Scene Coordinator (OSC) Tien Nguyen
Emergency Response Team

**THROUGH:** Steve Hawthorn, Supervisor
Emergency Response Unit

Douglas M. Skie, Director for Doug Skie
Preparedness, Assessment & Emergency Response Program

Max H. Dodson, Assistant Regional Administrator CLC for Dodson 6/22/00
Office of Ecosystem Protection and Remediation

Site ID#: BU

Category of Removal: Classic Emergency, Fund-Lead

## I. PURPOSE

The purpose of this Action Memorandum is to document the Removal Action described herein for the Rico Town Pond (aka Rico-Argentine) site (Site), Rico, Dolores County, Colorado. The response was initiated under the On-Scene Coordinator's (OSC) $250,000 funding authority and addressed the need to mitigate the threat posed by contaminated sludge and sediment in a settling pond with elevated concentrations of hazardous substances such as lead, cadmium and arsenic. The uppermost settling pond, located below the Rico-Argentine Mine, was full and its riverside embankment had begun to erode. The erosion had begun to allow water, sediment, and sludge from the settling pond to flow directly into the Dolores River. Conditions existing at the Site presented an imminent and substantial endangerment to human health and the environment and met the criteria for initiating a Classic Emergency Removal Action under 40 CFR, § 300.415 (b)(2) of the National Contingency Plan (NCP). The actions discussed in this memorandum required less than 12 months and two million dollars to complete.

Based on the nature of the Site conditions and response, there are no nationally significant or precedent-setting issues associated with this Removal Action.

## II. SITE CONDITIONS AND BACKGROUND

The response to the Site was initiated as a Classic Emergency by an OSC from the Region 8 Environmental Protection Agency (EPA). After observation of the situation, review of previous sampling/assessment, and confirmation of the potential release of effluent with high levels of hazardous substances from a settling pond into the Dolores River, a Removal Action was performed by EPA's Emergency Response Cleanup Services (ERCS). The CERCLIS ID number for the Site is COD980952519.

### A. SITE DESCRIPTION

#### 1. Removal Site Evaluation

Upon request from the Town of Rico, EPA visited the Site on April 14, 2000. An EPA OSC was accompanied by the Rico Town Manager and Attorney, the Mayor of Rico, a member of the Rico Board of Trustees, a member of the Rico Fire Department, and EPA's contractor as they evaluated the need for a Removal at the Site. During the Site visit, samples of water and sediment were collected from locations near the St. Louis adit/tunnel, settling ponds, and Dolores River.

Prior and subsequent to the April 14, 2000, Site visit, the OSC had reviewed the START Analytical Results Report dated June 19, 1996 (see Exhibit 1 - Attached). The START team had collected water and sediment samples at the Site in 1996, and results of the sediment collected from the uppermost settling pond revealed elevated levels of cadmium: 227 ppm, lead: 838 ppm, and arsenic: 49.4 ppm. The preliminary sampling results of the sediment taken on April 14, 2000, confirmed the results of the 1996 sampling. Members of the team who were touring the Site on 4/14/00 noted that as the weather continued to warm, the melting of the snowpack above the uppermost settling pond would probably increase and the erosion of the riverside embankment of the uppermost settling pond would accelerate, potentially releasing tons of contaminated sediment and sludge from the settling pond directly into the Dolores River.

#### 2. Physical Location

The Site is located in the Rico Mountains of southwestern Colorado and encompasses approximately 75 acres of settling ponds and tailings piles north and east of the town of Rico in Eastern Dolores County, Colorado. The legal description of the Site is the

southwestern quarter of Section 25, T.40N,R.11W. The approximate site coordinates are 37°42'05" North latitude and 108°01'39° West longitude.

## 3. Site Characteristics

The Rico-Argentine Site is an inactive mining and milling operation located in two drainages, the Dolores River and its tributary, Silver Creek. The St. Louis Tunnel adit, an inactive sulfuric acid plant, two inactive cyanide heap leach basins, 11 settling ponds, and two hot spring feed ponds are located along the east bank of the Dolores river approximately 1/4/ to 3/4 miles north of the Town of Rico. Water from the underground mine associated with the Rico-Argentine site, drains to the St. Louis Tunnel adit where it flows into a settling pond system prior to discharging into the Dolores River.

## 4. Release or Threatened Release into the Environment of a Hazardous Substance, Pollutant, or Contaminant

An inactive treatment plant is located at the St. Louis Tunnel. When the treatment plant was operational, lime was added to the tunnel effluent to precipitate the metals out of the effluent and cause the metals to drop to the bottom of the settling ponds. Lime is no longer added, but the effluent from the St. Louis tunnel continues to flow into the series of settling ponds. At the time the removal action was commenced, the uppermost settling pond, situated immediately adjacent to the Dolores River, was full and its riverside embankment had begun to erode. The erosion had begun to allow water, sediment, and sludge from the uppermost settling pond to flow directly into the Dolores River. Elevated levels of hazardous substances such as cadmium, lead and arsenic were present in the sludge and sediment of the uppermost settling pond. If the riverside embankment continued to erode, it would have ultimately collapsed releasing tons of contaminated sludge and sediment directly into the Dolores River.

## 5. NPL Status

This Site is not on the National Priorities List (NPL) and has not been proposed for the NPL.

## B. OTHER ACTIONS TO DATE

### 1. Previous Actions

In order to evaluate other areas of the Site in conjunction with EPA's Hazard Ranking System criteria, START had gathered data, as shown in its Analytical Results Report dated June 19, 1996 (see Exhibit 1 - Attached)

### 2. Current Actions

As described in Section II.A.1 of this Action Memorandum, EPA visited the Site on April 14, 2000. Prior to the visit, a "Consent for Access to Property" was requested from the property owner (see Exhibit 2 - Attached); a limited "Access Agreement" was granted by the owner which EPA used when visiting the Site on 4/14/00 (see Exhibit 3 - Attached). During the visit, samples of water and sediment were collected which verified the Analytical Results Report referenced above (Exhibit 1). The visiting team noted that the uppermost settling pond, immediately adjacent to the Dolores River, was full and its riverside embankment had begun to erode. The erosion had begun to allow water, sediment, and sludge from the uppermost settling pond to flow directly into the Dolores River. Since it was known from the Analytical Results Report that the sludge and sediment was contaminated with elevated levels of hazardous substances such as cadmium, lead and arsenic, it was determined that a Classic Emergency existed; however, the Removal Action was delayed in order for EPA to submit an application for a warrant to the United States District Court for the District of Colorado. The warrant application, seeking court approval for ongoing Site access for EPA to determine the need for and to undertake response action at the Site, was filed in court on April 18, 2000.

On April 19, 2000, the court issued the warrant, authorizing EPA's emergency response team to undertake the actions described in this Action Memorandum, thereby preventing the release of sludge and sediment contaminated with hazardous substances into the Dolores River.

The EPA ERCS Contractor mobilized to the Site on April 21 to prepare for the Removal. On April 24, after the Warrant was served on the property owner, the ERCS contractor began to stabilize the Site. Imported gravel was used to reinforce the riverside embankment of the uppermost settling pond. An area of the embankment, approximately 300 feet long and 12 feet

wide, was raised to at least 18 inches above the existing settling pond water level. An additional culvert consisting of two 8-inch pipes was built to drain the water from the uppermost settling pond into the downstream ponds. Also, an overflow riprap was built to drain the water should the culvert fail its functioning; this drain would prevent the water level in the uppermost settling pond from rising above the existing level.

The actions described above were concluded on April 26, 2000. At that time, the Removal Action was considered to be complete. It appears that the immediate actions taken by EPA were effective in limiting exposure to the hazardous substances contained in the sediment and sludge of the uppermost settling pond at the Site.

## C. STATE AND LOCAL AUTHORITIES' ROLE

### 1. State and Local Actions to Date

Eric Heil, Rico Town Manager and Attorney, sent letters and photographs to EPA describing and depicting the condition of the uppermost settling pond. Mr. Heil requested EPA assistance.

### 2. Potential for Continued State/Local Response

Neither the State nor local authorities had the expertise or resources to conduct a Removal Action.

## III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

The conditions at the Site presented a threat to public health or welfare or the environment and met the criteria for initiating a Removal Action under 40 CFR § 300.415(b)(2) of the NCP.

### A. Threats to Public Health or Welfare

The following factors from §300.415(b)(2) of the NCP formed the basis for EPA's determination of the threat present and the appropriate action to be taken:

1. Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants (a release of contaminated sediment and sludge from the uppermost settling pond into the Dolores River could have been ingested by fish and other

aquatic life in the river with the potential for further concentration of those contaminants as they moved up the food chain);

2. Actual or potential contamination of drinking water supplies or sensitive ecosystems (the Dolores River has been classified by the State of Colorado for domestic and agricultural uses as well as for cold water aquatic life use);

3. High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface, that may migrate (the levels of cadmium, lead and arsenic in the sludge and sediment in the uppermost settling pond were elevated);

4. Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released (the melting of the snowpack in the mountains in and around the Town of Rico was beginning to accelerate with the onset of Spring); and,

5. The unavailability of other appropriate federal or state response mechanisms to respond to the release (see II.C.2 above).

The following hazardous substances, as defined by Section 101(14) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), were present in elevated levels in the sediment and sludge of the uppermost settling pond at the Site.

Arsenic (As)

Large doses of arsenic may be acutely fatal. Symptoms include fever, loss of appetite, enlarged liver, and heart rhythm abnormalities. Sensory loss in the peripheral nervous system may also occur. Chronic exposure to arsenic generally results in skin lesions, liver injury, and peripheral vascular disease. The peripheral vascular disease may progress to endarteritis obliterans and gangrene of the lower extremities (blackfoot disease). Arsenic is a human carcinogen based on observation of increased lung cancer mortality due to inhalation exposure and increased skin cancer in individuals exposed to arsenic via drinking water.

Lead

Lead is classified as a B2 carcinogen by EPA. This classification is the result of animal studies

determining that these compounds are probable human carcinogens. Lead can enter the body via ingestion and inhalation. Children appear to be the segment of the population at greatest risk from toxic effects of lead. Initially, lead travels in the blood to the soft tissues (heart, liver, kidney, brain, etc.), then it gradually redistributes to the bones and teeth where it tends to remain. The most serious effects associated with markedly elevated blood lead levels include neurotoxic effects such as irreversible brain damage. Children have exhibited nerve damage, permanent mental retardation, colic, anemia, brain damage, and death.

Cadmium (Cd)

Cadmium is a hazardous substance as defined by Section 101(14) of CERCLA. It is a heavy metal, and has been shown to be a carcinogen in both animal studies and occupationally exposed groups of humans via the inhalation route of exposure. No evidence has linked cadmium to cancer via the ingestion pathway. The Carcinogenic Assessment Group (CAG) has classified cadmium as a Group B1 -- Probable Human Carcinogen for inhalation only based on limited evidence of carcinogenicity in humans from occupational studies. Cadmium may also be a human mutagen or teratogen, and thus may affect the kidneys, bones, liver, reproductive system, respiratory tract or immune system. Cadmium inhibits the body's ability to absorb essential elements, such as copper and calcium, and may lead to deficiencies of those elements. Exposure to toxic amounts of cadmium by either inhalation or ingestion will cause cadmium to accumulate in the renal system and eventually cause kidney failure.

## B. Threats to the Environment

The same factors identified in III.A above formed the basis for EPA's determination of the threat presented to the environment and the appropriate action to be taken. More specifically, wildlife in the adjacent habitats and the fish in the confluent waters are exposed to metals contamination either through direct contact with the effluents/sediments or indirectly through consumption of organisms (algae, aquatic insects, or animals) feeding in the area.

Although no threatened or endangered species have been identified at the Site, the Dolores River corridor is an important ecological resource for cold water fish and aquatic life and has been classified by the State of Colorado for cold water aquatic life use.

Arsenic

Arsenic may bioaccumulate in aquatic organisms. Arsenic bioaccumulates primarily in algae and lower invertebrates. The embryonic and larval stages of aquatic animals are generally the most sensitive and sediment-feeding organisms will contain higher metal concentration than other organisms.

Lead

Lead is ubiquitous in the environment and although bioaccumulation is known to occur, and lead is found in the tissue of many wild animals, including birds, mammals, fishes, and invertebrates, the most publicized effects of lead have been on the impact of ingestion of lead by waterfowl. Acute and chronic lead toxicity have been demonstrated as a definite threat to bird populations. There is also evidence that lead at high concentrations can eliminate populations of bacteria and fungi on leaf surfaces and in soil. Many of the microorganisms play key roles in the decomposer food chain.

Cadmium

Laboratory experiments suggest that cadmium may have adverse effects on reproduction in fish at levels present in lightly to moderately polluted waters.

## IV. ENDANGERMENT DETERMINATION

Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the Removal Action described in this Action Memorandum, may have presented an imminent and substantial endangerment to the public health or welfare or the environment.

## V. PROPOSED ACTIONS AND ESTIMATED COSTS

### A. PROPOSED ACTIONS

#### 1. Proposed Action Description

The actions undertaken are described in Section II.B of this Action Memorandum. Those actions were undertaken because it was clear that the mine effluent in the uppermost settling pond was not flowing adequately into the next settling pond. Since snowmelt in the mountains in and around Rico was beginning to accelerate as the ambient temperatures increased, the effluent level in the uppermost settling pond would have continued to rise and the pond's

riverside embankment would have continued to erode if action to facilitate the movement of the effluent into the next settling pond had not been taken. Similarly, since the riverside embankment of the uppermost settling pond had already begun to erode, it was necessary to reinforce the embankment to ensure its continuing integrity.

2. **Contribution to Remedial Performance**

N/A

3. **Description of Alternative Technologies**

N/A

4. **Engineering Evaluation/Cost Analysis (EE/CA)**

The Removal Action performed was a Classic Emergency and required immediate mobilization; therefore, an EE/CA was not required.

5. **Applicable or Relevant and Appropriate Requirements (ARARs)**

Because this action was a Classic Emergency, Federal and State ARARs were not identified.

6. **Project Schedule**

The Removal Action began on April 24, 2000 and was completed on April 26, 2000.

## B. ESTIMATED COSTS

| | |
|---|---|
| **Extramural Regional Allowance Costs:** | |
| Total Cleanup/Disposal Cost | $50,000 |
| **Intramural Costs:** | |
| Intramural Direct Costs | $ 5,000 |
| Intramural Indirect Costs | $ 5,000 |
| **TOTAL: REMOVAL PROJECT CEILING:** | **$60,000** |

## VI. EXPECTED CHANGE IN THE SITUATION IF ACTION HAD BEEN DELAYED OR NOT TAKEN

If the removal action had been delayed or not taken, the potential for sediment and sludge contaminated with hazardous substances to be released into the Dolores River would have increased substantially. If such a release had occurred, the public health or welfare or the environment may have been significantly impaired. Additionally, the cost of removing those sediments and sludge from

the Dolores River and restoring the ecosystem would have been levels of magnitude higher than the cost of the removal action that was performed.

## VII. OUTSTANDING POLICY ISSUES

None

## VIII. ENFORCEMENT

The enforcement is attached as Exhibit 4.

## IX. RECOMMENDATIONS

This decision document represents the selected Removal Action for the **Rico Town Pond** (aka Rico-Argentine) site, located north of the town of Rico, Dolores County, Colorado, developed in accordance with CERCLA, as amended, and not inconsistent with the NCP. This decision is based on the administrative record for the Site.

Conditions at the Site met the NCP § 300.415(b)(2) criteria for a removal and the removal was authorized under the OSC's response authority. The total project ceiling is estimated to be $60,000, and of this an estimated $50,000 will come from the Regional removal allowance.

On-Scene Coordinator

June 22, 2000
Date

**Attachments:**

**Exhibit 1 -** Analytical Results Report, START, 6/19/1996
**Exhibit 2 -** Consent for Access Agreement - Proposed
**Exhibit 3 -** Limited Access Agreement - Owner
**Exhibit 4 -** Enforcement Addendum

Exhibit 1

# START

Superfund Technical Assessment and Response Team - Region VIII

URS
OPERATING SERVICES, INC.

United States
Environmental Protection Agency

Contract No. 68-W5-0031

## ANALYTICAL RESULTS REPORT

**RICO ARGENTINE**
**Rico, Dolores County, Colorado**

**TDD #9511-0015**

**JUNE 19, 1996**

# ANALYTICAL RESULTS REPORT for EXPANDED SITE INSPECTION

## Rico-Argentine
## Rico, Dolores County, Colorado

## TABLE OF CONTENTS

## TABLE OF CONTENTS (continued)

## 1.0 INTRODUCTION

This Analytical Results Report (ARR) of the Rico-Argentine site in Rico, Dolores County, Colorado (CERCLIS ID # COD980952519), has been prepared to satisfy the requirements of Technical Direction Document (TDD) No. 9511-0015 issued to URS Operating Services, Inc. (UOS) on November 22, 1995, and amended by TDD No. 9511-0015A on January 25, 1996, by the Region VIII office of the U.S. Environmental Protection Agency (EPA). Field work at the Rico-Argentine site was conducted during the week of September 11 through 15, 1995, and followed the Expanded Site Inspection (ESI) format (U.S. Environmental Protection Agency (EPA) 1992).

Field activities were conducted by URS Consultants, Inc, (URS) and followed the applicable URS Technical Standard Operating Procedures (TSOPs). Field activities specifically included collecting 45 environmental samples comprised of 16 source samples, 11 surface water and 11 sediment samples, 6 residential soil samples, and 1 groundwater sample, plus 9 field Quality Assurance/Quality Control (QA/QC) samples (in addition to the laboratory matrix spike/matrix spike duplicate (MS/MSD) (Table 3). Non-sampling activities included gauging the flow of Silver Creek, Scotch Creek and the Dolores River, describing and delineating wetlands for approximately one mile along the Dolores River downstream of the confluence with Silver Creek, and measuring water quality parameters (pH, temperature and conductivity) at five non-sampling locations (Figure 2).

The samples were shipped through the contract laboratory program (CLP), routine analytical services (RAS). Samples that were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs) and pesticides/PCBs were sent to RECRA Environmental, Columbia, Maryland. Samples that were analyzed for cyanide and total or dissolved metals were sent to Southwest Labs of Oklahoma at Broken Arrow, Oklahoma. This ARR is intended to be used in conjunction with the Rico-Argentine Field Sampling Plan (FSP) (URS Consultants, Inc. (URS) 1995a) and the Rico-Argentine Sample Activities Report (URS 1995b) (Appendix A).

## 2.0 OBJECTIVES

The purpose of the ESI was to gather data pertinent to the evaluation of the Rico-Argentine site with regard to the EPA's Hazard Ranking System (HRS) criteria. The specific objectives of the ESI were to:

- Acquire and utilize non-sampling data (i.e., existing reports, analytical data or physical measurements) documenting past releases from the site source areas;
- Identify and delineate receptor targets for the surface water and groundwater pathways;
- Determine resident populations subject to contamination via the soil exposure pathway;
- Document potential release of site contaminants to users of groundwater from the alluvial aquifer; and
- Document potential releases of site contaminants to targets along the surface water pathway.

## 3.0 BACKGROUND INFORMATION

### 3.1 SITE LOCATION AND DESCRIPTION

The Rico-Argentine site is located in the Rico Mountains of southwestern Colorado and encompasses approximately 75 acres of settling ponds and tailings piles north and east of the town of Rico in Eastern Dolores County, Colorado (Figures 1 and 2). The legal description of the site is the southeast quarter of Section 25, T. 40 N, R. 11 W. The approximate site coordinates are 37° 42' 05" North latitude and 108° 01' 39" West longitude (U.S. Geological Survey (USGS) 1960). The Rico-Argentine site can be reached by proceeding south from Telluride, Colorado, on State Highway 145 over Lizard Head Pass to the town of Rico, or by proceeding north from Cortez, Colorado, on State Highway 145 to the town of Rico.

## 3.2 SITE DESCRIPTION

The Rico-Argentine site is an inactive mining and milling operation located in two drainages, the Dolores River and its tributary Silver Creek. Part of the site is within the northern and eastern city limits of Rico, Colorado. One part of the site extends northeastward up the Silver Creek drainage, and another part extends northward along the east bank of the Dolores River drainage (Figure 2). The Rico-Argentine Mill, Blain Tunnel and two large tailings piles are located adjacent to Silver Creek, approximately one mile east northeast of the town of Rico (Figure 2). The St. Louis Tunnel adit, an inactive sulfuric acid plant, two inactive cyanide heap leach basins, 11 settling ponds, and two hot spring feed ponds are located along the east bank of the Dolores River approximately 1/4 to 3/4 miles north of the town of Rico (Figure 2). Water from the underground mine working associated with the Rico-Argentine site drains from the mine to the St. Louis Tunnel adit, where it flows into the settling pond system prior to discharging into the Dolores River (URS 1995a; URS 1995b).

The Rico-Argentine has a National Pollutant Discharge Elimination System (NPDES) permit (#CO-0029793) dating from 1976, and has frequently been in violation of permit standards (U.S. Environmental Protection Agency (EPA) 1994). The discharge has also been regulated under the Colorado Pollutant Discharge Elimination System (CPDES). The discharge averages approximately 1.1 million to 1.5 million gallons per day (EPA 1994).

The Rico, Colorado, area has been heavily mined and several potential sources of contamination, primarily settling ponds and tailings piles, have been identified along Silver Creek and the Dolores River (URS 1995a). The exact origin of all of the specific potential sources is unknown. The area surrounding the Rico-Argentine site is primarily Bureau of Land Management (BLM) land located within the San Juan National Forest, with surrounding peaks reaching 14,000 feet above mean sea level (msl) and summits in the local Rico Mountains reaching more than 12,000 feet above msl. The town of Rico and the settling ponds along the east bank of the Dolores River are at 8,800 feet above msl and the Rico-Argentine Mill and tailings along Silver Creek are at 9,200 feet above msl (USGS 1960).

## 3.3 SITE HISTORY AND PREVIOUS WORK

The Rico area has an extended mining history of which a detailed account can be found in the Site Inspection Prioritization Report (URS 1994). Early mining activity in the Rico area began in the 1860s when several claims were staked in the Pioneer District at the confluence of Silver Creek with the Dolores River. Silver production reached a peak in 1893. In 1902, all of the important mines in the district were consolidated under the United Rico Mine Company which primarily produced base metal ores. The Rico-Argentine Mining Company, was formed in 1915 to produce base metal ores. A custom mill was built in 1926 by the International Smelting Company, a subsidiary of Anaconda Mining Company. Base metal ore production peaked in 1927 but by 1928 the mill had shut down and by 1932 all mining activity in the area had ceased (USGS 1974).

The Rico-Argentine Mining Company resumed sporadic mining activities in 1934 and resumed steady production in 1939 (State of Colorado, Department of Natural Resources, Bureau of Mines (BOM) 1939a; BOM 1939b). A sulfuric acid plant located north of the settling ponds along the Dolores River was operated between 1955 and 1964 (USGS 1974). All mining operations again ceased in 1971 and most of the mine workings were allowed to flood and drain through the St. Louis Tunnel (BOM 1971).

The Rico-Argentine Mining Company built a 300-foot by 500-foot leach pad next to the old sulfuric acid plant in 1973. A cyanide solution was used to leach silver and gold from raw ore, and an overflow of an unknown quantity of leaching liquor to the Dolores River occurred sometime in 1974 (BOM 1974). In 1975 an additional cyanide leach pad was constructed in a settling pond originally used by the acid plant (BOM 1975).

A Notice of Violation (NOV) and a Cease and Desist Order (CDO) were issued to the Rico-Argentine Mining Company in 1990 by the Colorado Department of Health and Water Quality Control Division because of the company's failure to meet the compliance of its NPDES permit (EPA 1994).

A review of the Colorado Department of Public Health and the Environment Water Quality Control Division's files, for the Rico-Argentine CDPS Permit No. CO-0029793, revealed the following discharge permit condition violations in 1995 (State of Colorado Department of Public Health and the Environment (CDPHE) 1988):

**TABLE 1**
**Discharge Permit Condition Violations in 1995**
**(reported in mg/ℓ)**

| Report Period | Parameter | Reported Results | Permit Conditions |
|---|---|---|---|
| 04/95 | Total Recoverable Cadmium | 0.0035 (30-day avg.) | 0.0004 (30-day avg.) |
| 04/95 | Total Recoverable Zinc | 0.57 (30-day avg.) | 0.237 (30-day avg.) |
| 05/95 | Total Recoverable Cadmium | 0.0065 (30-day avg.) | 0.0004 (30-day avg.) |
| 05/95 | Total Recoverable Zinc | 0.75 (30-day avg.) | 0.237 (30-day avg.) |
| 07/95 | Total Recoverable Cadmium | 0.0125 (30-day avg.) | 0.0004 (30-day avg.) |
| 07/95 | Total Recoverable Zinc | 2.85 (30-day avg.) | 0.237 (30-day avg.) |
| 09/95 | Total Recoverable Cadmium | 0.0025 (30-day avg.) | 0.0004 (30-day avg.) |
| 09/95 | Total Recoverable Zinc | 0.37 (30-day avg.) | 0.237 (30-day avg.) |

Anaconda purchased the property in 1980 and in response to the outstanding NOV and CDO, carried out several environmental efforts such as building a water treatment plant at the St. Louis Tunnel discharge, capping wells, plugging adits, and stabilizing tailings and treatment ponds (Anaconda Minerals Company (AMC) 1994).

The EPA collected surface water and sediment samples from Silver Creek and the Dolores River during a site inspection conducted in November 1984. Analytical results indicated that the surface

water and sediments contained elevated concentrations of arsenic, cadmium, copper, iron, lead, manganese and zinc (Ecology and Environment (E&E) 1985).

Rico Development Corporation purchased the property in 1988 (CDPHE 1988). NOVs and CDOs were issued to Rico Development Corporation in 1990 for violations of the NPDES permitted discharge levels of lead and silver standards, in 1993 for violations of the silver standards, and in 1994 for violations of silver, lead and zinc standards (CDPHE 1995; EPA 1994).

The U.S. Department of Interior, Bureau of Reclamation conducted surface water and sediment sampling in the Dolores River and its tributaries between 1989 and 1993. The results show Silver Creek to be a major, but not the only, source of mercury and other heavy metals in the upper Dolores River Basin (U.S. Department of the Interior, Bureau of Reclamation, undated).

The Atlantic Richfield Corporation (ARCO) has initiated a voluntary environmental site characterization of the town of Rico and surrounding area within the framework of the Colorado Voluntary Cleanup and Redevelopment Act (PTI Environmental Services and ESA Consultants 1995).

## 3.4 SITE GEOLOGY

Detailed information about the geology of the Rico, Colorado, area can be found in "Geology and Ore Deposits of the Rico District, Colorado," by Edwin T. McKnight (USGS 1974). The geology of the Rico District is extremely complex in detail. The dominant structure of the district is a faulted dome centered on a monzonite stock. Sedimentary strata exposed in the area are the Ouray and Leadville limestones, overlain by the Hermosa Formation, whose limestone beds are the source of the district's massive sulfide ore deposits. The youngest sedimentary strata in the Rico District is the red beds of the Cutler Formation. The lower slopes of the Rico District are generally covered by debris resulting from wash, talus and landslide processes (USGS 1974). Surface materials in the valley sides and bottoms are glacial or stream deposits (URS 1995c).

## 3.5 SITE HYDROGEOLOGY

A shallow unconfined aquifer is located in the glacial, stream, wash, talus and landslide debris found along the valley floors. Groundwater in the shallow aquifer would be greatly influenced by seasonal weather conditions and the nearby surface water bodies. Conductivity is assumed to be high, between $10^{-2}$ to $10^{1}$ centimeters per second (cm/sec) (USGS 1987). Groundwater flow should follow the valley contours.

Deeper bedrock aquifers are found at the site. Several exploratory drill holes along the Dolores River portion of the site flowed water and were capped (AMC 1988; AMC 1994). Two exposed and several underwater geothermal springs are found along the Dolores River. Water quality data in Table 2 from the two exposed geothermal springs indicates a common source. Water flowing from these springs is depositing calcium carbonate and iron about the springs and there are visible geothermal deposits between the springs and the town of Rico (URS 1995a; URS 1995c).

**TABLE 2**
**Geothermal Springs Water Quality (9-12-95)**

| | Water Temp. (°F) | pH (Std Units) | Conductivity ($\mu$s/cm) | Flow (gal/min) |
|---|---|---|---|---|
| Hot Tub Spring | 107.9 | 6.60 | 7,280 | 30-50 |
| 2nd Hot Spring | 107.3 | 6.66 | 7,080 | 15-20 |

## 3.6 SITE HYDROLOGY

The Rico-Argentine site is located in the Dolores River Basin. The Dolores River and its tributary Silver Creek are the major surface water bodies in the area. The Dolores River flows to the south past the St. Louis Tunnel adit, the old sulfuric acid plant, the cyanide heap leach basins, the tailings piles, settling ponds and the NPDES Outfall 002 (Figure 2). Silver Creek flows from the east, past the old mill site and several tailings piles and through the town of Rico before joining

the Dolores River west of Rico (Figure 2). The 41-year annual mean flow on the Dolores River, approximately four miles below the town of Rico, is 136 cubic feet per second (cfs) and the upstream drainage basin encompasses 105 square miles (USGS 1993). The flow rate of Silver Creek was measured during the September 14, 1995, field work at sample station RA-SW/SE-07 (Figure 2). The average of three readings was 10.1 cfs and the upstream drainage basin of Silver Creek encompasses an estimated seven square miles (USGS 1976; URS 1995b).

### 3.7 SITE METEOROLOGY

The Rico-Argentine site is located in a semiarid climate zone. The mean annual precipitation, as totaled from the University of Delaware (UD) database, is 12.8 inches. The net annual precipitation as calculated from precipitation and evaporation data obtained from the UD is 4.1 inches (University of Delaware (UD) 1986). The 2-year, 24-hour rainfall event for the site is approximately 1.5 inches (Dunne and Leopold 1978).

## 4.0 FIELD OPERATIONS

Field operations for the Rico-Argentine ESI included the collections of groundwater, surface water, sediment, residential soil and source samples. Other tasks performed during the field operations at the site included wetlands characterization, stream flow measurements, interviews with local residents, characterization of thermal springs and measurement of field water quality parameters for non-sampled tributary streams of the Dolores River.

### 4.1 SAMPLE COLLECTION ACTIVITIES

Sampling activities included the collection of 45 samples, specifically 16 source, 1 groundwater, 11 stream surface water, 11 stream sediment and 6 residential soil samples. Additionally, 9 QA/QC samples plus a laboratory MS/MSD were collected. Table 3 lists the sample locations and rationale for each sample.

## 4.2 NON SAMPLE COLLECTION FIELD ACTIVITIES

The following non-sampling activities were conducted during the Rico-Argentine ESI (URS 1995b):

- Delineation and characterization of wetlands along the Dolores River for approximately one mile downstream of the confluence with Silver Creek.

  Unconsolidated bottom land obligate wetlands were identified along the Dolores River downstream of the confluence with Silver Creek. Individual wetlands are less than one acre in size. Obligate emergent wetlands are located immediately south of Rico and approximately one mile south of the confluence of Silver Creek and the Dolores River, on the Dolores River between sample stations RA-07 and RA-08 (Figure 2). The wetlands on the west side of the Dolores River cover approximately two to three acres and the wetlands on the east side of the river are less than one acre in size.

- Measuring the flow of the NPDES Outfall 002 flume, Silver Creek and the Dolores River within the site boundaries on September 15, 1996. Site investigators employed a Marsh McBirney flow meter to measure these flows.

  The flow of the NPDES Outfall 002 flume was measured and determined to be 6.25 cfs or approximately 540,000 cubic feet per day.

  Three stream flow measurements were taken of Silver Creek at sample station RA-07 (Figure 2). These flow measurements were 10.35 cfs, 11.00 cfs, and 8.96 cfs. The average of these three readings is 10.1 cfs, or approximately 872,000 cubic feet per day.

The flow of the Dolores River was measured and determined from a single measurement taken between sample stations RA-02 and RA-03 (Figure 2). The flow was measured at

48.16 cfs or approximately 4,160,000 cubic feet per day. This flow measurement compares well with the flow published for the U.S. Geological Survey's (USGS's) Montelores Bridge gauging station downstream of Rico (Figure 2) which for September 15, 1993 was 51 cfs and for September 15, 1994, was 69 cfs (USGS 1993; USGS 1994).

- Interviewing local residents to determine if any anecdotal evidence could be discovered concerning use of mine tailings as fill or construction material in the town of Rico.

  The field teams interviewed over a dozen local residents, many of whom have lived in Rico for decades. No construction or fill materials were positively identified by local residents as derived from mine tailings. Material which the residents or field crews believed were characteristic of mine tailings were preferentially sampled.

- Characterization of thermal springs by measuring flow and the field parameters of pH, conductivity and water temperature.

  Field water quality readings were taken and flow estimated for the two subaerial thermal springs located at the site (Table 2). Similar water quality parameters indicate a common source. Several other hot springs were noted to be bubbling through ponds located south of the settling ponds.

- Measuring field water quality parameters of pH, conductivity and water temperature of six tributary streams entering the Dolores River below the town of Rico, Colorado, as a screen for unusual conditions which would trigger sampling.

  All tributary streams exhibited normal ranges of pH, conductivity and temperature. No opportunity sampling of the tributaries was required.

# 5.0 ANALYTICAL DATA

## 5.1 DATA VALIDATION AND INTERPRETATION

The sample data collected during this ESI was reviewed using the HRS guidelines for analytical interpretation (Office of the Federal Register 1990). As reported in the analytical results in Tables 4 through 21, elevated concentrations of contaminants, as noted by a star (★), are determined by sample concentrations based on the following:

- If the sample concentrations are greater than or equal to three times the highest background sample concentrations and greater than or equal to five times the blank concentrations and greater than or equal to the sample quantitation limit (SQL); and

- If not detected in background or blank samples, the sample concentrations are greater than or equal to the SQL.

All data analyzed by the CLP RAS laboratories were validated by the Environmental Services Assistance Team (ESAT). All data are acceptable for use as qualified in the data validation report. The complete data validation report, laboratory forms and SQL calculations are located in Appendix D.

## 5.2 QUALITY ASSURANCE/QUALITY CONTROL SAMPLES

The results of QA/QC samples are presented in Tables 20 and 21. The inorganic analyses of field QA/QC samples included rinsate samples and indicate that the decontamination procedures were effective (Table 20). There are no confirmed detections of inorganic compounds that are above the Contract Required Quantitation Level (CRQL). The organic analyses of QA/QC samples included trip and rinsate blanks collected from de-ionized water in the field (Table 21). The QA/QC sample results presented in Table 21 show only detections of acetone and chloroform

which are common laboratory contaminants. These laboratory contaminants have been corrected for in the final analytical results.

# 6.0 SOURCE CHARACTERIZATION

## 6.1 SOURCE SAMPLE LOCATIONS

Source Samples were collected from the two abandoned cyanide leach pits along the Dolores River (RA-WSO-01 and RA-WSO-02), a spring flowing from beneath the abandoned cyanide leach pits (RA-WSW-09), the St. Louis Tunnel outfall (RA-WGW-01), the hot-tub geothermal spring (RA-WGW-02) (Photo 5), the uppermost settling pond (RA-WSW-01/RA-WSE-01) (Photo 1), the lowermost settling pond (RA-WSW-02/RA-WSE-02), the drainage ditch between the upper settling ponds and the Dolores River (RA-WSW-03/RA-WSE-03) (Photo 4), the stained soil adjacent to a fuel tank at the mill site (RA-WSO-08), the tailings piles along upper Silver Creek, just below the old mill building (RA-WSO-03 and RA-WSO-04) (Photo 2), tailings at the confluence of Silver Creek and the Dolores River (RA-WSO-05), and from two tailings piles along the Dolores River south of Rico (RA-WSO-06 and RA WSO-07) (Photos 12 and 13). Please refer to Figure 2 for the exact sample locations and to Table 3 for sample rationale.

The source samples can be divided into three different groups: soils and tailings along Silver Creek and the Dolores River; the tailings ponds along the Dolores River; and the groundwater sources. The background for inorganic and organic soil parameters are found in Tables 9 and 10, as background sample RA-SO-01. Background for inorganic and organic surface water and sediment parameters are found in Tables 14 through 19 as background samples RA-SW-01 (Dolores River) and RA-SW-05 (Silver Creek). Background for inorganic and organic groundwater parameters can be found in Tables 10 and 11 as background sample RA-GW-01.

Source areas are posted but are not secured from public access. There are several locations along Silver Creek and the Dolores River where tailings were noted to be slumping into surface water

bodies. The settling ponds along the Dolores River are in good condition and no evidence of a spill was located during the field work (URS 1995b).

## 6.2 SOURCE ANALYTICAL RESULTS

Source samples contained a total of six VOCs. Acetone, carbon disulfide, 2-butanone, 2-hexanone, tetrachloroethene, and toluene were all detected in source soils and tailings (Table 5). Only acetone and 2-butanone were detected, in a single sample, above the method detection limit. This sample was an opportunity sample from underneath a leaking fuel tank at the Silver Creek Mill site. A single acetone detection below the method detection limit, was reported in the uppermost settling pond (Table 7).

Source samples contained a total of 12 SVOCs. Chrysene, fluoranthene, bis(2-ethylhexyl) phthalate, di-n-octylphthalate, butylbenzylphthalate, di-n-butylphthalate, pyrene, phenanthrene, benzo (a) anthracene, benzo (b) fluoranthene, benzo (a) pyrene, and phenol were all detected below the method detection limit and flagged as estimated by the validator (Tables 5 and 7).

Source samples contained a total of 10 pesticides. Aldrin was detected in three samples below the method detection limit (Tables 5 and 7). All other pesticides were detected in the opportunity soil sample (RA-WSO-08, Table 5) from beneath a leaking fuel tank. The pesticides detected are aldrin, endosulfan II, endrin aldehyde, endrin ketone, heptachlor, gamma-Chlordane, 4,4'-DDE, 4,4'DDD, endosulfan sulfate, and methoxychlor. All detections were below the method detection limit except endrin ketone, 4,4'DDE and 4,4'DDD (Table 5).

Source samples were analyzed for cyanide. Background for cyanide in the Rico area is approximately 0.5 parts per million (ppm). Source samples from the Rico-Argentine site can be divided into two groups, one group that is near background and one group that is approximately 10 times background. Source sediment/soil samples from the uppermost cyanide leach pit (RA-WSO-01), the tailings piles along Silver Creek (RA-WS0-03 and RA-WSO-04), and the

uppermost settling pond (RA-WSE-01) all recorded cyanide levels greater than background and are reported as elevated concentrations (Tables 4 and 6).

Source samples that were analyzed for inorganic analytes other than cyanide indicated elevated concentrations above the background for aluminum, antimony, arsenic, barium, cadmium, calcium, chromium, copper, iron, lead, mercury, nickel, selenium, silver, thallium and zinc (Tables 4 and 6). The analytical results were generally between approximately two to ten times background and are characteristic of mining waste material. Most of the elevated readings were from the tailings piles along Silver Creek and the Dolores River where cadmium, calcium, copper, iron, lead, silver and zinc occurred in most samples at between five to ten times background. There appears to be no discernable difference between the tailings along Silver Creek and the tailings along the Dolores River. The sample from the upper cyanide leach pit has elevated concentrations from background of aluminum, chromium, iron, lead, nickel and silver and the sample from the lower cyanide leach pit has slightly elevated concentrations from background of cadmium, copper, iron and nickel (Table 6). The samples from the settling ponds indicate that all the settling pond water and sediments have elevated concentrations of calcium. Calcium is used in the water treatment process to reduce the acidity of the mine water outfall (Anaconda Minerals Company 1994). Sediment in the uppermost (first) settling pond contains elevated concentrations of aluminum, antimony, arsenic, cadmium, calcium, copper, and lead; and the aqueous sample from the uppermost settling pond contains elevated levels of calcium and copper (Table 6).

## 7.0 GROUNDWATER PATHWAY

### 7.1 GROUNDWATER SAMPLE LOCATIONS

Only one groundwater sample was collected during this ESI. This groundwater sample was collected from the domestic well at the Rico Ranger Station, northwest of the site. Please refer to Figure 2 for the exact sample location and to Table 2 for the sample rationale. The sample was specifically collected from the spigot used as a source of water for the trailer where the summer

staff lives on site. The well draws water from valley fill talus, landslide, and alluvial material, and is across the Dolores River (west) and topographically above the site (URS 1995c).

### 7.2 GROUNDWATER ANALYTICAL RESULTS AND TARGETS

Analytical results of the groundwater sample did not reveal the presence of any organic compounds (Table 9). Analytical results of the inorganic samples, both total and dissolved metals, show detectable concentrations of barium, calcium, magnesium, manganese, potassium, sodium and zinc (Table 8). The detections and concentrations of inorganics detected in the groundwater well do not indicate contamination or contact with the source areas of the Rico-Argentine site.

## 8.0 RESIDENTIAL SOIL EXPOSURE PATHWAY

### 8.1 RESIDENTIAL SOIL SAMPLE LOCATIONS

Residential soil samples were collected from six properties within the town of Rico (Photos 7, 8, 9, 10, and 11). Please refer to Figure 2 and Table 3 for exact sample locations and rationale. Signed access agreements were obtained from all property owners before the sample was taken. Samples were taken from areas on the properties that the field crew or residents believed could potentially contain fill material derived from local mine workings.

### 8.2 RESIDENTIAL SOIL ANALYTICAL RESULTS AND TARGETS

There were no detections of VOCs in any of the residential soil samples (Table 9). There were detections of 17 SVOCs, primarily in samples RA-SO-02, RA-SO-04 and RA-SO-05, and estimated detections of three SVOCs were made in sample RA-SO-06. The compounds detected were generally qualified as estimated, except for detections at RA-SO-02, because quality control criteria were not met. Minor estimated detections of three SVOCs were made in sample RA-SO-06. The compounds positively identified from sample RA-SO-02 are fluoranthene,

pyrene, benzo (a) anthracene, chrysene, benzo (b) fluoranthene, benzo (k) fluoranthene, and benzo (a) pyrene.

Pesticides were detected in small amounts in all samples at low concentrations, which were estimated because quality control criteria were not met (Table 13). The pesticides detected were endosulfate, 4,4'-DDD, heptachlor, aldrin, heptachlor epoxide, endosulfan I, 4,4'-DDE, endrin, 4,4'-DDT, endrin ketone, alpha-chlordane, gamma-chlordane, and delta-BHC. These compounds could be expected to be present if commercial pesticides were used at these homes. These compounds are not associated with any Rico-Argentine source.

The inorganic results for two of the residential soil samples, RA-SO-03 and RA-SO-05, were very close to background. Four of the samples, RA-SO-02, RA-SO-04, RA-SO-06 and RA-SO-07, exhibited elevated concentrations of inorganics (Table 12). Elevated concentrations of copper were found in four samples. Elevated concentrations of lead were found in three samples, RA-SO-02, RA-SO-04, and RA-SO-07. Elevated concentrations of antimony, arsenic, manganese, mercury, silver, and zinc were found in at least two samples. Single detections, at separate locations, of cadmium, calcium, sodium, magnesium, vanadium and cyanide were recorded at elevated concentrations. When these locations are plotted on a map, the area defined by these elevated concentrations is approximately 776,000 square feet.

# 9.0 SURFACE WATER AND SEDIMENT PATHWAY

## 9.1 AQUEOUS AND SEDIMENT SAMPLE LOCATIONS

Three surface water and sediment samples, including a specific background sample, were collected from Silver Creek. Eight surface water and sediment samples, including a specific background sample, were collected from the Dolores River. Please refer to Figure 2 and Table 3 for exact sample locations and rationale.

The analytical results for each drainage are presented separately in the following discussions.

## 9.2 SILVER CREEK - AQUEOUS AND SEDIMENT ANALYTICAL RESULTS AND TARGETS

The background sample on Silver Creek (RA-SW/SE-05) was taken just upstream from the Rico municipal drinking water intake (Figure 1). A review of the analytical results presented in Tables 14 and 15 for Silver Creek and in Tables 16, 17, 18 and 19 for the Dolores River indicate that background conditions in both streams are similar.

Two qualified detections of tetrachloroethene (PCE) were made in sediment from Silver Creek (samples RA-SE-06 and RA-SE-07) (Table 15). Both detections are estimated values that are below the detection limit. There was also a very low level estimated detection of tetrachloroethene made in the source sample RA-WSO-03 (Table 5) which was taken from tailings along upper Silver Creek.

Phthalates were detected from the background sample (RA-SE-05) and from the sample just below the tailings (RA-SE-06). The detections are probably the result of sample collection or laboratory contamination. The sediment in Silver Creek tended to be composed of cobbles and boulders and considerable digging and picking were required to collect a sufficient quantity of fine-grained sediment for analysis.

Elevated concentrations of iron, manganese, and zinc were detected in both of the downstream aqueous samples (Table 14). The samplers noted that water seemed to be seeping from beneath the tailings pile directly into the creek. The concentrations decreased from the sample station just below the Silver Creek tailings piles (RA-SE-06) to the sample station located on Silver Creek just before the confluence with the Dolores River (RA-SW-07). Photo 3 shows the rusty-colored iron staining near the location of sample station RA-SW-06. The rusty-colored staining was less noticeable at RA-SW-07.

Elevated concentrations of 14 inorganics were detected from sediment at sample station RA-SE-06 (Table 14). The sampling crew noted that the stream was in direct contact with the tailings. It was

observed that tailings were slumping into the creek and that the creek bed appeared to be composed entirely of fine-grained tailings material derived from the tailings piles along the creek. Most of the elevated concentrations of inorganics were flagged by the validator as estimated because of the dilution required before the concentrated sample could be analyzed. Three metals were positively identified: beryllium, copper and selenium. Ten metals were identified and their quantity estimated because quality control criteria were not met. These 10 metals are aluminum, arsenic, cadmium, calcium, iron, lead, manganese, nickel, silver, and zinc.

An unqualified elevated concentration of copper was detected at RA-SE-07 located on Silver Creek just before the confluence with the Dolores River (Table 14). Elevated concentrations with estimated values were detected at RA-SE-07 for six inorganic compounds: arsenic, iron, lead, manganese, silver, and zinc. Elevated concentrations at the downstream Silver Creek sample location (RA-SE-07) were between one-half to one-tenth those of the upstream location (RA-SE-06). Seven inorganic compounds, aluminum, beryllium, cadmium, calcium, nickel, selenium, and cyanide that were detected at elevated concentrations at the upper sample station (RA-SE-06) were not detected at elevated concentrations at the lower sample station (RA-SE-07).

A survey of Silver Creek from the Rico municipal water intake to the confluence with the Dolores River (Figure 2) performed during the URS field sampling in September 1995 did not detect any wetlands or evidence of a fishery. The flow of Silver Creek was determined to be approximately 10.1 cfs (see Section 4.2). Concrete reinforced rip-rap was in place along the upper end of the tailings pile along the Silver Creek stream course. This containment prevented the tailings from entering the stream. There were no containment features along the more downstream reaches of Silver Creek where tailings were coming into direct contact with the stream, as noted at sample location RA-SW/SE-06 (URS 1995b).

## 9.3 DOLORES RIVER - AQUEOUS AND SEDIMENT ANALYTICAL RESULTS AND TARGETS

Eight aqueous and sediment samples were taken along the Dolores River. The background sample was taken on the east bank of the river, across from the Rico Ranger Station. There is no indication, either physical or analytical, that the background location is influenced by the site.

The aqueous organic samples (Table 17) indicated only one isolated very low level detection of carbon disulfide at RA-SW-09. This location is south (downstream) of Rico and adjacent to approximately one acre of wetlands (Figure 2). This single organic detection does not appear to be related to any identifiable source.

The aqueous inorganic samples (Table 16) present a more consistent picture. Iron and manganese are found at elevated concentrations in all Dolores River samples downstream of the background sample (RA-SW-01). Zinc is detected at elevated concentrations in all Dolores River aqueous samples below RA-SW-02 (Figure 2). The highest concentrations of iron, manganese, zinc and copper are also found in aqueous sample RA-SW-08. Iron at this location is 54 times background, manganese is 20 times background, zinc is 68 times background, and copper is 8 times background. These elevated concentrations cannot be traced directly back to Silver Creek or the Outfall 002 from the settling ponds, since concentrations actually decrease at the previous sample location on the Dolores River (RA-SW-04).

There are also elevated concentrations of aluminum from sample stations RA-SW-02 and RA-SW-08. These two stations report aluminum concentrations that are approximately ten times background and there is no apparent source for these concentrations. All other sample stations report aluminum readings near background (Table 16).

Organic sediment sample results from the Dolores River (Table 19) report an estimated result for tetrachloroethene at RA-SE-08. An elevated concentration of acetone is reported in the duplicate (RA-SE-11) and is probably due to laboratory contamination. Phthalates are reported at low concentrations in several samples and are probably the results of sample collection or laboratory contamination. 4-methylphenol is also estimated to be present below the detection limit in the most

downstream sample and in the duplicate of that sample (RA-SE-10 and RA-SE-11). This is most likely the result of laboratory contamination.

Elevated concentrations of inorganic compounds are recorded at two sample stations on the Dolores River, stations RA-SE-08 and RA-SE-09 (Table 19 and Figure 2). Both of these sample stations are located near tailings piles that are being actively eroded by the Dolores River (Photos 12 and 13). There are no elevated concentrations of inorganic compounds reported for any other sediment sample along the Dolores River (Table 18). Copper is positively identified at elevated concentrations at both sample stations. The copper in the sediment is elevated to 9 times background at sample station RA-SE-08 and to 5.5 times background at the next most downstream location, RA-SE-09. Lead, manganese, and zinc are all detected at estimated quantities, below the detection limit but above background, at RA-SE-08 and RA-SE-09. The concentrations of lead, manganese, and zinc in the sediment range from three to five times background..

There is substantial evidence of sport fishing along the Dolores River in the Rico area. The field sampling crews observed and interviewed several cold water trout fisherman, particularly below Rico, between sample stations RA-SE/SW-08 and RA-SE/SW-10 (URS 1995b).

The field crew also measured and classified several wetlands for one mile along the Dolores River between the confluence of Silver Creek with the Dolores River and RA-SW/SE-09 (see section 4.2). Several small wetlands (less than one acre) were noted for the first three-quarters of a mile. A larger palustrine scrub/shrub (obligate) wetland, approximately five acres in size, was documented between three-quarters of a mile and one mile downstream of the Silver Creek/Dolores River confluence (Figure 2).

## 10.0 SUMMARY

Field work conducted at the Rico Argentine site in Rico, Colorado, during the week of September 11 through September 15, 1995, involved the collection of samples for laboratory analyses and non-sampling site specific information. This information has been used in this report to evaluate pathways and associated targets to determine if the Rico Argentine site potentially impacts the environment or human health.

The air pathway was not evaluated during this site inspection because no evidence was discovered during the background research which would indicate that a potential release to the air pathway was possible.

No groundwater users were identified during the field work. The only groundwater well located was the background well at the Rico Ranger Station. Data collected for this site inspection was inconclusive regarding the groundwater pathway.

Soil samples were collected from six residences. Organic compounds found in the residential soil samples can not be directly attributed to the site and are most likely the result of activities occurring at each specific residence. Samples from four of the residences had elevated concentrations of metals, which indicate that tailings material, from an unspecified source, could have been used as fill on the property. These locations define the boundaries of an area that covers approximately 766,000 square feet.

Aqueous and sediment samples were taken from Silver Creek and the Dolores River. The results of these samples indicate that there are localized incidents of metals entering the surface water and sediment of these streams from tailings that are not contained. Areas that appear to be potential sources of contamination are the lower part of the tailings piles on Silver Creek and the tailings piles that are being actively eroded along the Dolores River, south of Rico. These tailings piles appear to be a source for localized contamination that occurs immediately downstream of the tailings piles on Silver Creek and the Dolores River.

Source areas which are controlled by engineered containment features, such as the berm on the tailings on upper Silver Creek and the water treatment and settling pond system for the St. Louis Discharge do not appear to be the source for elevated concentration of metals in the surface waters and sediments of Silver Creek and the Dolores River. A review of the water quality data for the Dolores River ("pH on Dolores River" (Figure 3) and "Conductivity on Dolores River" (Figure 4) in Appendix A - Sample Activities Report) indicate that Outfall 002 and Silver Creek significantly influence water quality on the Dolores River at their respective points of confluence. A review of the analytical data from samples collected for this ESI indicates that Outfall 002 and Silver Creek are not the probable source of metals contamination in the Dolores River.

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# FIGURE 1
## Site Location

# FIGURE 2
## Sample Locations

## TABLE 3
### Sample Locations and Rationale

| Sample Matrix | Sample ID | Location | Rationale |
|---|---|---|---|
| Surface Water | RA-SW-01 | Upstream of site influences on the Dolores River. | Establish background conditions on the Dolores River. |
| | RA-SW-02 | Adjacent to tailings piles on the Dolores River. | Test for impacted fishery. |
| | RA-SW-03 | Confluence of drainage from settling ponds and the Dolores River. | Test for impacted fishery. |
| | RA-SW-04 | Confluence of Silver Creek and the Dolores River. | Test for impacted fishery. |
| | RA-SW-05 | Upstream of site influences on Silver Creek. | Establish background conditions on Silver Creek. |
| | RA-SW-06 | Downstream of tailings piles on Silver Creek. | Test for impacted fishery. |
| | RA-SW-07 | Silver Creek, downstream of tailings pile in town of Rico. | Test for impacted fishery. |
| | RA-SW-08 | 1.7 miles downstream of Outfall 002 on the Dolores River. | Test for impacted fishery and/or segment of impacted wetlands downstream of Outfall 002. |
| | RA-SW-09 | 1.9 miles downstream of Outfall 002 on the Dolores River. | Test for impacted fishery and/or segment of impacted wetlands downstream of Outfall 002. |
| | RA-SW-10 | 2.8 miles downstream of Outfall 002 on the Dolores River. | Test for impacted fishery and/or segment of impacted wetlands downstream of Outfall 002. |
| | RA-SW-11 | 5.8 miles downstream of Outfall 002 on the Dolores River. | Test for impacted fishery and/or segment of impacted wetlands downstream of Outfall 002. |
| Sediment | RA-SE-01 | Upstream of site influences on the Dolores River. | Establish background conditions on the Dolores River. |
| Sediment (continued) | RA-SE-02 | Adjacent to tailings piles on the Dolores River. | Test for impacted fishery. |

**TABLE 3**
**Sample Locations and Rationale**
**(continued)**

| Sample Matrix | Sample ID | Location | Rationale |
|---|---|---|---|
| | RA-SE-03 | Confluence of drainage from settling ponds and the Dolores River. | Test for impacted fishery. |
| | RA-SE-04 | Confluence of Silver Creek and the Dolores River. | Test for impacted fishery. |
| | RA-SE-05 | Upstream of site influences on Silver Creek. | Establish background conditions on Silver Creek. |
| | RA-SE-06 | Downstream of tailings pile on Silver Creek. | Test for impacted fishery. |
| | RA-SE-07 | Silver Creek, downstream of tailings pile in the town of Rico. | Test for impacted fishery. |
| | RA-SE-08 | 1.7 miles downstream of Outfall 002 on the Dolores River. | Test for impacted fishery and/or segment of impacted wetlands downstream of Outfall 002. |
| | RA-SE-09 | 1.9 miles downstream of Outfall 002 on the Dolores River. | Test for impacted fishery and/or segment of impacted wetlands downstream of Outfall 002. |
| | RA-SE-10 | 2.8 miles downstream of Outfall 002 on the Dolores River. | Test for impacted fishery and/or segment of impacted wetlands downstream of Outfall 002. |
| | RA-SE-11 | 5.3 miles downstream of Outfall 002 on the Dolores River. | Test for impacted fishery and/or segment of impacted wetlands downstream of Outfall 002. |
| **Surface Soil** | RA-SO-01 | Sample from off-site location, outside of site influences. | Establish background soil conditions. |
| | RA-SO-02 | Opportunity soil sample from residential property in Rico. | Establish contaminated soil source area. |
| **Surface Soil (continued)** | RA-SO-03 | Opportunity soil sample from residential property in Rico. | Establish contaminated soil source area. |
| | RA-SO-04 | Opportunity soil sample from residential property in Rico. | Establish contaminated soil source area. |

## TABLE 3
## Sample Locations and Rationale

| Sample Matrix | Sample ID | Location | Rationale |
|---|---|---|---|
| | RA-WSO-07 | Tailings along the Dolores River, one mile south of Rico. | Characterize tailings pile. |
| | RA-WSO-08 | Opportunity soil sample from soil in the vicinity of fuel tank at the mill site. | Characterize former contents of empty tank. |
| | RA-WSW-01 | Aqueous sample from uppermost settling pond adjacent to the Dolores River. | Characterize contents of settling pond. |
| | RA-WSW-02 | Aqueous sample from lowermost settling pond adjacent to the Dolores River. | Characterize contents of settling pond. |
| | RA-WSW-03 | Aqueous sample from ditch adjacent to upper settling ponds along the Dolores River. | Characterize contents of ditch. |
| | RA-WSE-01 | Sediment sample from uppermost settling pond adjacent to the Dolores River. | Characterize contents of settling pond. |
| | RA-WSE-02 | Sediment sample from lowermost settling pond adjacent to the Dolores River. | Characterize contents of settling pond. |
| | RA-WSE-03 | Sediment sample from ditch adjacent to upper settling ponds along the Dolores River. | Characterize contents of ditch. |
| QA/QC | RA-SW-18 | VOA Trip Blank Sample | Document contamination introduced during sample handling and shipping. |
| | RA-SW-19 | VOA Trip Blank Sample | Document contamination introduced during sample handling and shipping. |

## TABLE 3
## Sample Locations and Rationale

| Sample Matrix | Sample ID | Location | Rationale |
|---|---|---|---|
| | RA-SO-05 | Opportunity soil sample from residential property in Rico. | Establish contaminated soil source area. |
| | RA-SO-06 | Opportunity soil sample from residential property in Rico. | Establish contaminated soil source area. |
| Groundwater | RA-GW-01 | Groundwater sample from upgradient well in the Dolores River Valley. | Establish background conditions in same aquifer as downgradient groundwater sample. |
| Adit Sample | RA-WGW-01 | Source sample from the outfall of the St. Louis Tunnel. | Characterize mine discharge from St. Louis Tunnel. |
| Hot Spring Sample | RA-WGW-02 | Surface water sample from geothermal spring adjacent to settling pond. | Characterize public use geothermal spring. |
| Source Characterization | RA-WSO-01 | Soil sample from abandoned cyanide leach pits along the Dolores River. | Characterize cyanide leach pits. |
| | RA-WSO-02 | Soil sample from abandoned cyanide leach pits along the Dolores River. | Characterize cyanide leach pits. |
| | RA-WSO-03 | Tailings piles along Silver Creek. | Characterize tailings piles. |
| | RA-WSO-04 | Tailings piles along Silver Creek. | Characterize tailings piles. |
| Source Characterization (continued) | RA-WSO-05 | Tailings pile at confluence of Silver Creek and the Dolores River. | Characterize tailings pile. |
| | RA-WSO-06 | Tailings pile along the Dolores River, south of Rico. | Characterize tailings pile. |

## TABLE 3
## Sample Locations and Rationale

| Sample Matrix | Sample ID | Location | Rationale |
|---|---|---|---|
| | RA-SW-20 | VOA Trip Blank Sample | Document contamination introduced during sample handling and shipping. |
| | RA-SW-22 | Rinsate Blank Sample | Document thoroughness of decontamination procedures on soil sampling equipment |
| | RA-SW-23 | Rinsate Blank Sample | Document thoroughness of decontamination procedures on soil sampling equipment |
| | RA-SW-24 | Rinsate Blank Sample | Document thoroughness of decontamination procedures on sediment sampling equipment. |
| | RA-SW-25 | Rinsate Blank Sample | Document thoroughness of decontamination procedures on soil sampling equipment. |
| | RA-SW-26 | Duplicate of RA-SW-04 | Determine the precision of sample collection procedures and laboratory analyses. |
| | RA-SW-27 | Duplicate of RA-SW-11 | Determine the precision of sample collection procedures and laboratory analyses. |
| | RA-SW-93 | VOA Trip Blank Sample | Document contamination introduced during sample handling and shipping. |

URS Operating Services, Inc.
START, EPA Region VIII
Contract No. 68-WS-0031

# TABLE 6
## Source Aqueous and Sediment Inorganic Sample Results from Settling Ponds
### Concentrations in µg/l or mg/kg

| Sample ID: | | 2352713 | 2352711 | 2352707 | 2352706 | 2352709 | 2 |
|---|---|---|---|---|---|---|---|
| Case #: | | 24008 | 24008 | 24008 | 24008 | 24008 | |
| Traffic Report #: | | MHDA95 | MHDA93 | MHDA89 | MHDA88 | MHDA91 | M |
| Location: | | RA-WSE-01 | RA-WSW-01 | RA-WSE-02 | RA-WSW-02 | RA-WSE-03 | RA |
| Location Description | | Sediment sample from uppermost settling pond adjacent to the Dolores River (mg/kg) | Aqueous sample from uppermost settling pond adjacent to the Dolores River (µg/l) | Sediment sample from lowermost settling pond adjacent to the Dolores River (mg/kg) | Aqueous sample from lowermost settling pond adjacent to the Dolores River (µg/l) | Sediment sample from ditch adjacent to upper settling ponds along the Dolores River (mg/kg) | Aqueous s adjacent ponds alon |
| Aluminum | (Al) | 25500 J | 3860 J | 8560 J | 53.3 J | 3620 J | |
| Antimony | (Sb) | 19.6 UJ | 3.0 U | 1.8 UJ | 3.0 U | 0.88 U | |
| Arsenic | (As) | 49.4 | [6.9] | 12.9 | 2.0 U | 10.6 | |
| Barium | (Ba) | [94.5] | [23.9] | [44.7] | [13.1] | [54.2] | |
| Beryllium | (Be) | 13.6 | 2.3 UJ | 1.3 U | 1.0 U | 0.48 UJ | |
| Cadmium | (Cd) | 227 | 26.4 | 10.9 | [1.9] | [0.32] | |
| Calcium | (Ca) | 153000 J | 215000 | 13700 J | 206000 | 5700 J | |
| Chromium | (Cr) | [15.5] | [1.9] | 13.5 | 1.0 U | 4.2 | |
| Cobalt | (Co) | [40.5] | [5.2] | [12.5] | 1.0 U | [4.4] | |
| Copper | (Cu) | 4250 J | 453 | 69.2 J | [4.2] | 12.8 J | |
| Iron | (Fe) | 195000 J | 28500 | 19800 J | 297 | 12300 J | |
| Lead | (Pb) | 838 J | 172 | 137 J | 1.0 U | 19.0 J | |
| Magnesium | (Mg) | [8470] | 19800 | 7530 | 20200 | 2290 | |
| Manganese | (Mn) | 18600 J | 2950 | 3900 J | 820 | 483 J | |
| Mercury | (Hg) | 1.2 U | 0.20 U | 0.13 U | 0.20 U | 0.15 U | |
| Nickel | (Ni) | [63.7] | [10.0] | 20.2 | [2.4] | [8.2] | |
| Potassium | (K) | [8050] | 5050 | 1660 | [4830] | [1240] | |
| Selenium | (Se) | 4.8 U | 2.0 U | 0.54 U | 2.0 U | 0.59 U | |
| Silver | (Ag) | [8.0] | [1.2] | [2.3] | 1.0 U | 0.29 U | |
| Sodium | (Na) | 2480 UJ | 9010 | 38.0 U | 9110 | 75.8 UJ | |
| Thallium | (Tl) | 4.8 U | [4.3] | 0.54 U | [3.4] | 0.59 U | |
| Vanadium | (V) | [9.0] | [1.5] | [10.5] | 1.0 U | [10.1] | |
| Zinc | (Zn) | 43900 J | 5660 | 1300 J | 351 | 79.3 J | |
| Cyanide | (CN) | [3.1] | 3.0 U | 0.20 U | 3.0 U | 0.22 U | |

J The associated numerical value is an estimated quantity because quality control criteria were not met.
U The analyte was not detected at reported concentration (qualified by laboratory software).
UJ The associated numerical value is an estimated quantity because quality control criteria were not met. The analyte was not detected.
[] The associated numerical value was detected below the CRDL, but greater than the method detection limit and is therefore an estimate (qualified by laboratory software). Presence of the compound is reliabl

Exhibit 2

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VIII
LEGAL ENFORCEMENT PROGRAM
999 18th STREET - SUITE 500
DENVER, COLORADO 80202-2466

# FACSIMILE COVER

DATE: April 13, 2000

TO: Joshua Epel, Esq.

AGENCY/COMPANY: Gablehouse & Epel

CITY: _____ STATE: _____ MAIL CODE: _____

FAX NUMBER: (303) 572-3037 TEL #: _____

NUMBER OF PAGES (Including Cover Sheet): 3

FROM: Sheldon H. Muller

SENDER'S TELEPHONE NUMBER: (303) 312-6916

SENDER'S FAX NUMBER: (303) 312-6953

COMMENTS: Josh,
Please FAX to Wayne Webster and then have him sign and FAX back to me, or to you and then to me. Thank you for your help.
Sheldon

____ HARD COPY TO FOLLOW
__X__ HARD COPY WILL NOT BE SENT

SENDER: _____
DATE/TIME: _____

## CONSENT FOR ACCESS TO PROPERTY

I, the undersigned, am the owner, its/their representative, or otherwise control the real property upon which are located one or more ponds that have been used to treat effluent from the St. Louis tunnel located at what is referred to as the Rico Argentine Mine in or near Rico, Colorado (hereinafter referred to as "the Property"). The United States Environmental Protection Agency (EPA) has requested access to my property pursuant to its response and enforcement responsibilities under the Comprehensive Environmental Response, Compensation and Liability Act, as amended (Superfund), 42 U.S.C. § 9601 et seq.

I consent to officers, employees, and authorized representatives of the EPA, including their authorized contractors, entering and having continued access to the Property in order to conduct a removal site assessment and, if necessary, a removal action designed to allow the effluent in the ponds to freely flow from one pond to the next. I further allow access to State officials who may accompany them. I understand that it is anticipated that the site assessment and, if necessary, the removal action, may last approximately 3-10 working days and will commence on or about April 14, 2000. Access is granted for the purpose of investigation, monitoring, surveying, testing and the undertaking of any action reasonably designed to eliminate the threat of release of effluent and sediments from the ponds into the Dolores River.

Site activities may include:

- Touring the property.
- Photographing on-site conditions.
- Selecting potential sampling locations.
- Collecting samples of soil, water sediment and air samples.
- Sampling source materials stored or disposed of onsite.
- Removing debris from the ponds.
- Installing devices to facilitate the movement of effluent from one pond to the next.

I understand that the work described above may involve among other things, disturbance of vegetation and soil on the Property.

It is my right to request split samples (a reasonable duplicate of materials samples) where an adequate quantity of sample is available. I understand that I am responsible for supplying necessary bottles at the time of sampling and making my own laboratory arrangements.

Property address or description:

Series of ponds located adjacent to the St. Louis Tunnel
Rico Argentine Mine
Rico, Colorado

This written permission is given by me voluntarily with knowledge of my right to refuse and without threats or promises of any kind.

_____ _____

(Signature) (Date)

Exhibit 3

GABLEHOUSE & EPEL, LLC
A Law Partnership Of Professional Corporations

1050 SEVENTEENTH STREET
SUITE 1730
DENVER, COLORADO 80265

(303) 572-0050
FAX (303) 572-3037

# FAX COVER PAGE

Date: April 14, 2000

TO (Organization): US EPA

ATTENTION: SHELDON MULLER, ESQ.

CITY: DENVER, CO

FAX NUMBER: (303) 312-6953

FROM: Joshua B. Epel

Number of pages (including this page): __
Hard copy to follow? __ yes __ no

SHELDON:

ATTACHED IS MR. WEBSTER'S LIMITED ACCESS AGREEMENT. HE WOULD NOT SIGN YOUR PROPOSED AGREEMENT.

WAYNE WEBSTER

E.P.A. OR CO. HEALTH DEP'T. HAS
MY PERMISSION TO GO ON THE PROPERTY
IN QUESTION TO CATCH THE BEAVER AND
REMOVE DEBRIS FROM PONDS BROUGHT IN BY
THE BEAVER

Wayne Webster